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# **Spaceport & Technology Committee**

**Tuesday, March 7, 2006**

**2:00 PM to 4:00 PM**

**Room 12, HOB**

**ACTION PACKET**

**COMMITTEE MEETING REPORT**  
**Spaceport & Technology Committee**

**3/7/2006 2:00:00PM**

**Location:** 306 HOB

**Attendance:**

	<i>Present</i>	<i>Absent</i>	<i>Excused</i>
Bob Allen (Chair)	X		
Thad Altman	X		
Joyce Cusack	X		
Charlie Justice	X		
Ralph Poppell	X		
Juan Zapata	X		
<b>Totals:</b>	<b>6</b>	<b>0</b>	<b>0</b>

**COMMITTEE MEETING REPORT**  
**Spaceport & Technology Committee**  
**3/7/2006 2:00:00PM**

**Location:** 306 HOB

**Other Business Appearance:**

Mr. Lee Arnold, General Council (At Request Of Chair) - Information Only  
Office of Representative Tom Feeney  
323 Cannon HOB  
Washington, DC 20515-0924  
Phone: 202/225-2706

Mr. Brendan Curry, VP for Government Affairs (At Request Of Chair) - Information Only  
Space Foundation  
1620 I Street SW, Suite 615  
Washington, DC 20006  
Phone: 202/463-6122

Ms. Linda Weatherman, President & CEO (At Request Of Chair) - Information Only  
Economic Development Commission of Florida's Space Coast  
597 Haverty Court, Suite 100  
Rockledge, Florida 32955  
Phone: 321/633-4200

Mr. Adrian Laffitte, Director, Government Relations (At Request Of Chair) - Information Only  
Lockheed Martin  
P.O Box 321399 Mail Stop: MRL Room 108  
Cocoa Beach, Florida 32932  
Phone: 321/476-2367

Mr. Billy Specht, Manager of Education (At Request Of Chair) - Information Only  
KSC Visitor Complex, Delaware North Parks & Resorts at KSC, Inc.  
Mail Code: DNPS  
Kennedy Space Center Florida 32899  
Phone: 321/449-4360

Dr. Gerry G. Meisels, Director and Professor of Chemistry (At Request Of Chair) - Information Only  
Coalition for Science Literacy at the USF  
4202 East Fowler Avenue CHE205  
Tampa, Florida 33620  
Phone: 813/974-7183

Mr. Daniel LeBlanc, VP & Chief Operating Officer (At Request Of Chair) - Information Only  
KSC Visitor Complex  
Delaware North Parks & Resorts at KSC, Inc. Mail Code: DNPS  
Kennedy Space Center Florida  
Phone: 321/449-4236

Mr. Jim Frederick, Director, Space Systems (At Request Of Chair) - Information Only  
Raytheon  
Clearwater, Florida  
Phone: 727/302-3004

Mr. Bruce Melnick, VP of Boeing Florida Operations (At Request Of Chair) - Information Only  
The Boeing Company  
Cocoa Beach, Florida  
Phone: 321/867-2630

**COMMITTEE MEETING REPORT**  
**Spaceport & Technology Committee**

**3/7/2006 2:00:00PM**

**Location:** 306 HOB

Mr. Randy Berridge, President (At Request Of Chair) - Information Only  
Florida High Tech Corridor Council  
801 International Parkway, 5th Floor  
Lake Mary, Florida 32746  
Phone: 407/562-1910

Mr. Joe Wright, Director of Programs (At Request Of Chair) - Information Only  
Launch Vehicles & systems Enterprise  
Honeywell AES 13350 U.S. Highway North M/X 840-3  
Clearwater, Florida 33764-7290  
Phone: 727/539-2737



**COMMITTEE MEETING REPORT**  
**Spaceport & Technology Committee**

**3/7/2006 2:00:00PM**

**Location:** 306 HOB

**Summary:** No Bills Considered

**Lee F. Arnold, General Counsel  
Office of Congressman Tom Feeney  
Presentation before Florida House of Representatives  
Spaceport and Technology Committee  
Tuesday, March 7, 2006**

***Obligatory Disclaimers***

The following reflects the personal views of Mr. Arnold and does not necessarily reflect the views of Congressman Feeney.

To continue the conversation, please feel free to contact Mr. Arnold at any time for any reason. My direct dial number is 202-226-2773 and my email is L.Arnold@mail.house.gov

***Dynamic Change in Space Industry***

Six years, Florida's space industry rested on two assumptions:

- The Space Shuttle would regularly fly for 20+ years, thereby providing a steady stream of work for engineers, technicians, and suppliers.
- The telecommunications boom and attendant constellations of satellites would fuel robust launch rates.

The Columbia Accident in February 2003, bursting of the telecommunications bubble, and development of competing technologies (e.g. fiber cable vs. communications satellite) undercut these assumptions.

Lessons Learned – The space industry and Florida's role in that business will substantially change.

Florida officials must firmly face these challenges rather than cling to past dreams and visions.

In 2005, a number of Florida leaders such as Governor Bush, Lieutenant Governor Jennings, Chairman Allen, the members of the Governor's Commission on the Future of Space and Aeronautics in Florida, and other members of the aerospace community stepped up to this test. From my Washington perspective, the progress made in one year has been heartening.

### ***Current Situation – Change and Opportunity***

Human spaceflight represents the largest part of Space Coast operations. In response to the Columbia accident, the President proposed and Congress endorsed (by large bipartisan majorities) the Vision for Space Exploration.

Under Mike Griffin's leadership (and Griffin will be visiting Tallahassee next week), NASA is implementing the Vision for Space Exploration and transitioning from Shuttle operations (low earth orbit) to a post-Shuttle environment (exploration of the Moon, Mars, and beyond).

- Shuttle labor-intensive operations will cease in 2010
- Post-Shuttle human spaceflight will use a crew vehicle (Crew Exploration Vehicle or CEV) and launch system that CEV launch operations will require smaller workforce.
- In 2006, Griffin will focus on how to transition these programs in order to avoid the disruption occurring in the 1970's Apollo-Shuttle transition while retaining America's spacefaring knowledge base.
- Assuming regular Shuttle operations resume, NASA and NASA contractor workforces will hold steady and possibly increase through 2010 as Shuttles fly and facilities constructed and workforces assembled for post-Shuttle spaceflight. That scenario changes after the Shuttle is retired.
- Locating CEV final assembly and checkout work at the Kennedy Space Center (KSC) would partially offset job losses. Two teams are competing for CEV work and NASA will select a winner this summer. Lockheed Martin has agreed to locate this work at KSC. Northrop Grumman/Boeing has not yet announced its plans.
- NASA will strive to use commercial entities to fly cargo and crew to the International Space Station after Shuttle retirement (a program known as Commercial Orbital Transportation Services or COTS). The pertinent question is whether these entities will become viable or whether NASA will have to ultimately provide these services.

If viable entities emerge (essentially a space logistics business), they could provide additional Space Coast operations. But Florida must provide a favorable environment for these entities.

Launch and payload processing for government, defense, and commercial uses (traditional Space Coast activities) are mature and offer limited growth opportunities.

- Sharply contrasts with the false promise of high launch rates that have been a staple of space industry lore since the 1960's (the Saturn, Titan, and Shuttle programs all at one time envisioned robust operations of 10-25 flights per year). These forecast rates have never been achieved.
- Future launch and payload processing operations will focus on wringing efficiencies from operations (i.e. reducing standing workforces).

Growth and economic value in space increasingly comes from applications of space-based resources (value-added) such as navigation, earth-observation, direct broadcast, and communications along with the design and construction of space-based hardware. That development will be on display next month at the National Space Symposium in Colorado Springs, Colorado. Florida has enterprises successfully competing in this arena (e.g. Harris, Honeywell) but their activities are overshadowed by Space Coast launch operations.

Space tourism (also known as self-loading carbon payloads) is a promising but unproven industry that hasn't started operations.

Several interesting and innovative space entrepreneurs exist (many of which will be competing for a share of NASA's COTS program). COTS will help separate those with promise from those offering Blue Sky.

In evaluating new ventures, some prudence is advised. Spaceflight is a difficult enterprise. As Mike Griffin noted in 2003:

*...despite the passage of sixty years since the invention of the first vehicles capable of reaching space, the task of reaching Low Earth Orbit - reliably, routinely, and cost-effectively -- continues to elude us...*

*The task is difficult. To reach Low Earth Orbit, we must package the energy required for an intercontinental aircraft flight in a container with the volumetric efficiency of an eggshell, yet which is tough enough to withstand high inertial, thermal, and aerodynamic loads.*

*The stored energy must be expended within a few minutes, and prevented from being expended in a few seconds. Each launch of an expendable vehicle is its maiden flight, an event performed under only the most*

*carefully controlled and limited conditions in aeronautics, yet which in astronautics must be a maximum-performance event.*

*A reusable vehicle must survive a return through an atmospheric flight regime so rigorous it cannot be simulated in even the highest performance wind tunnels; such a vehicle can be fully tested only by flying it "for real".*

### ***Economic Development Efforts***

Economic development efforts involve more than waiting for the phone to ring. They require ongoing engagement with the industry and matching Florida assets with changing industry needs -- principles of marketing 101 and economic development 101. One must determine an enterprise's needs and propose innovative solutions (e.g. incentives, facilities, training, regulatory) to fit that situation.

In regards to economic development efforts, the space industry does not possess unique characteristics that significantly distinguish it from other industries. And it belongs in an aerospace category. The same principles apply especially having thorough knowledge about the industry and intelligence regarding other state's economic development efforts.

Thus, Florida's aerospace economic development efforts are probably more effectively housed in a single entity possessing substantial economic development expertise.

### ***Florida Space-Related Governmental and Educational Entities***

The numerous entities have confusing or overlapping jurisdictions, missions, and responsibilities. Substantial clarification must occur just like that undergone by NASA after the Columbia accident.

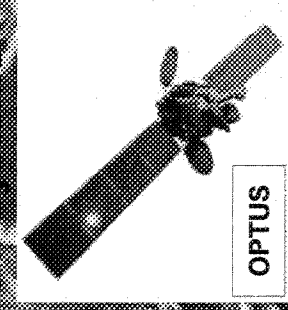
Regardless of how the organizational chart is eventually drawn, strong leadership is needed.

The Governor and Legislature needs to conduct rigorous oversight of these entities. In evaluating performance, don't focus on activity. Focus on tangible results along with the reputation of these entities within the national space community.

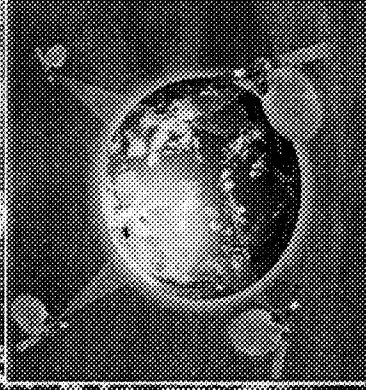
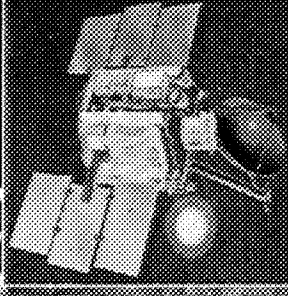
### ***Education***

Quality research universities provide a focal point for developing pockets of high technology innovation. California, Maryland, Colorado, and Texas provide examples of how to develop and maintain these focal points.

Communication  
Systems



Space  
Payloads



Innovative Network  
Solutions

MUOS MSI

Raytheon Capabilities  
Overview Space Systems  
St Petersburg, FL  
March 2006

Jim Frederick  
Space Program Director

Network Centric Systems

# Raytheon Company

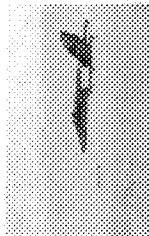
# Raytheon

**Raytheon Company**

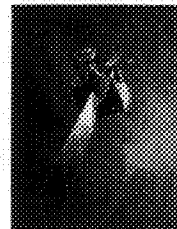
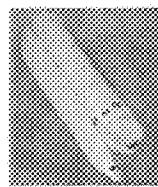
**Bill Swanson**

President

## Missile Systems



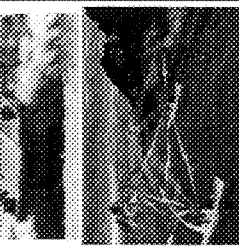
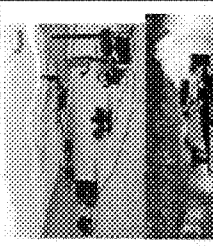
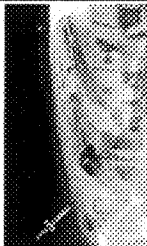
## Space & Airborne Systems



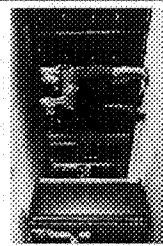
## Integrated Defense Systems



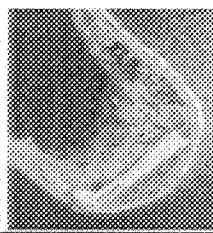
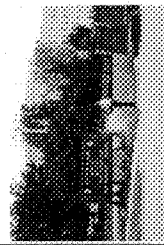
## Network Centric Systems



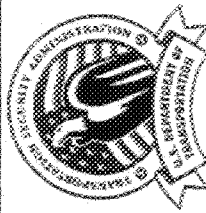
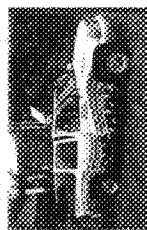
## Intelligence & Information Systems



## Raytheon Technical Services Company



## Homeland Security

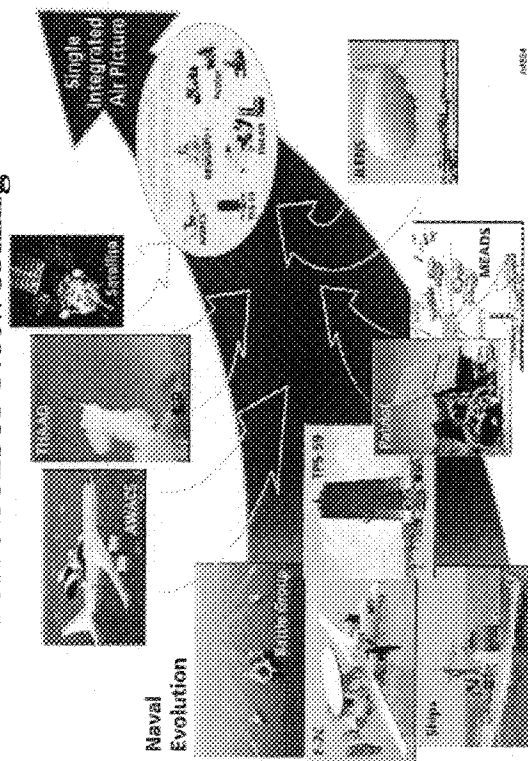


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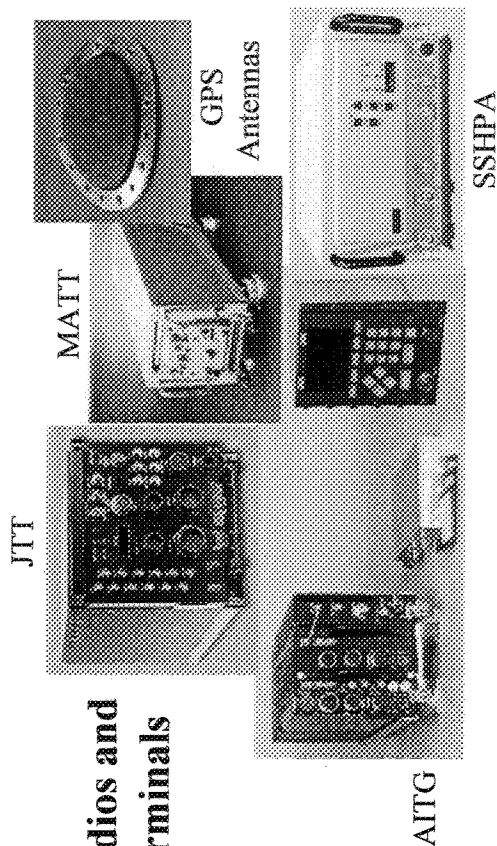


# St. Petersburg Product Lines

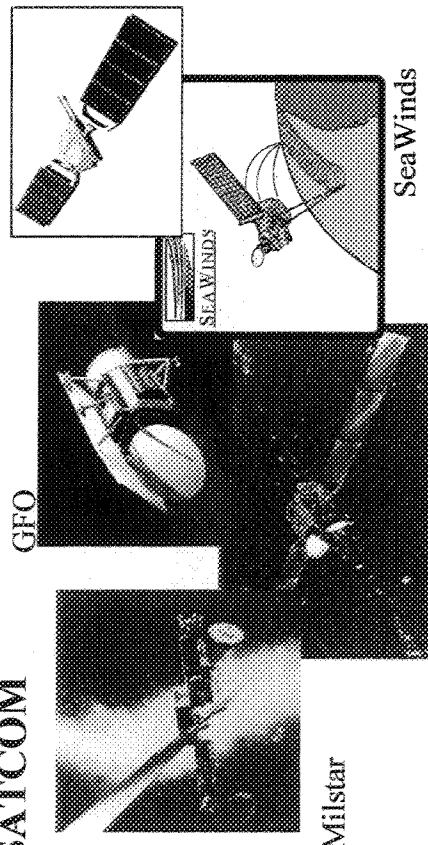
## C<sup>2</sup>BM – Joint Sensor Networking



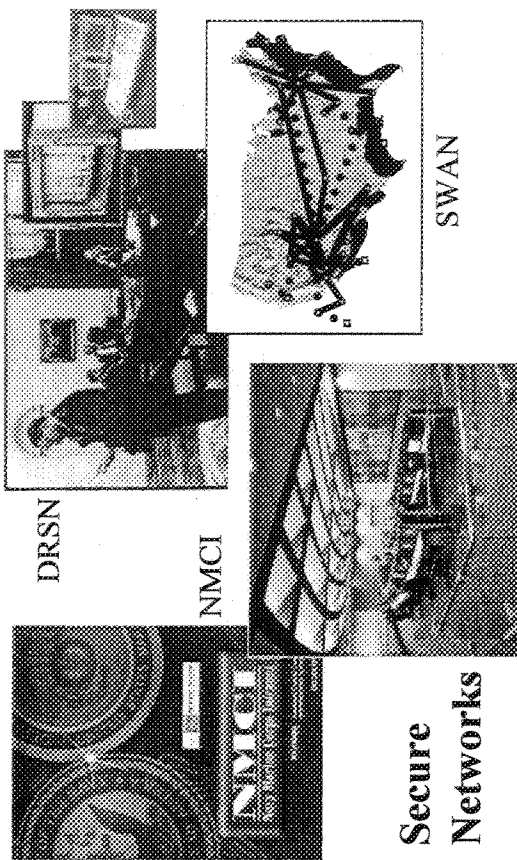
## Radios and Terminals



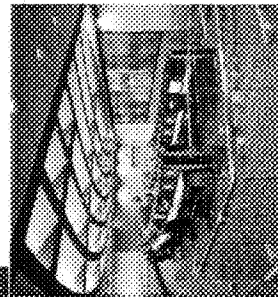
**SATCOM**



## Milstar



# Secure Networks

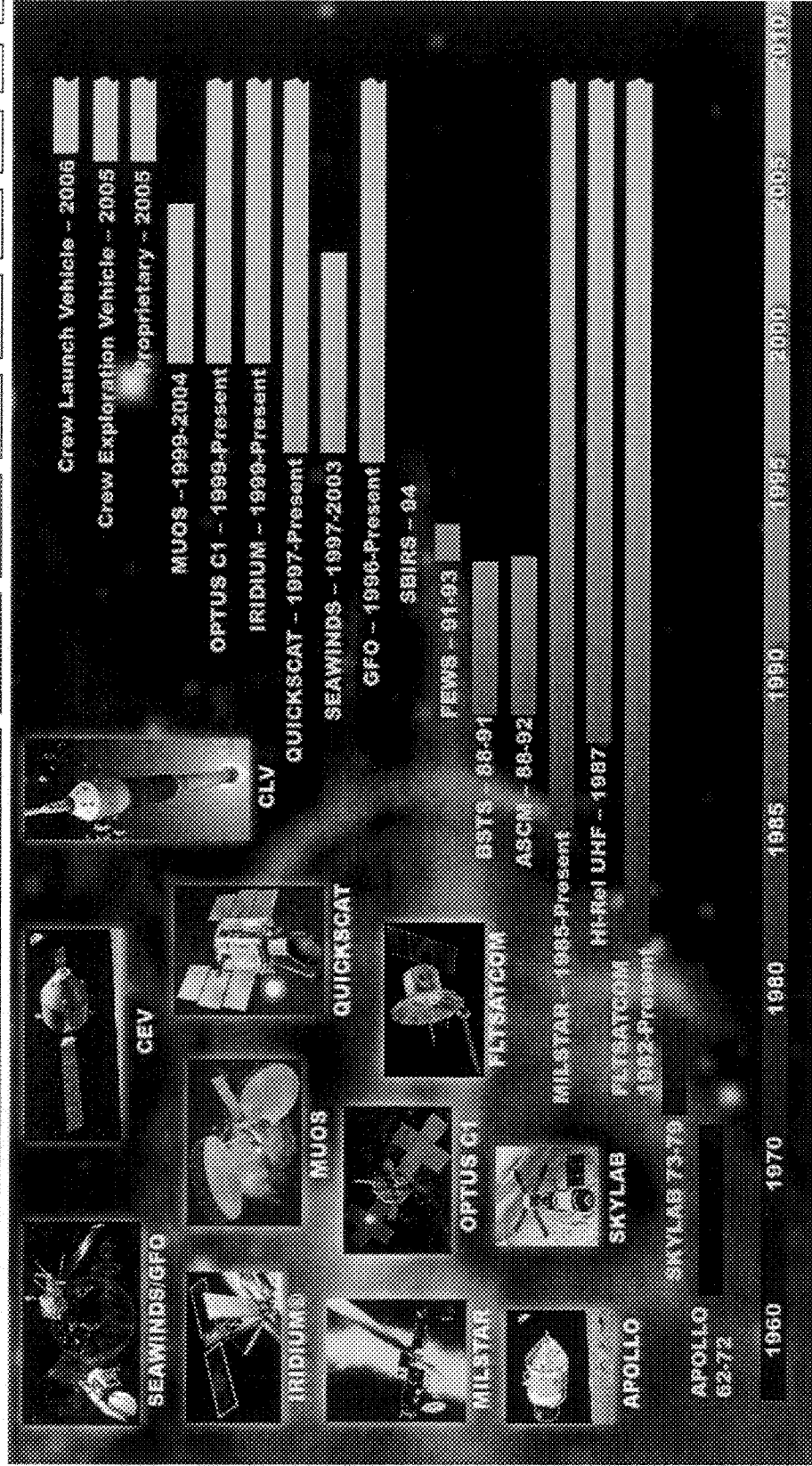


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# Space Systems Integration, Payloads and Communication Systems

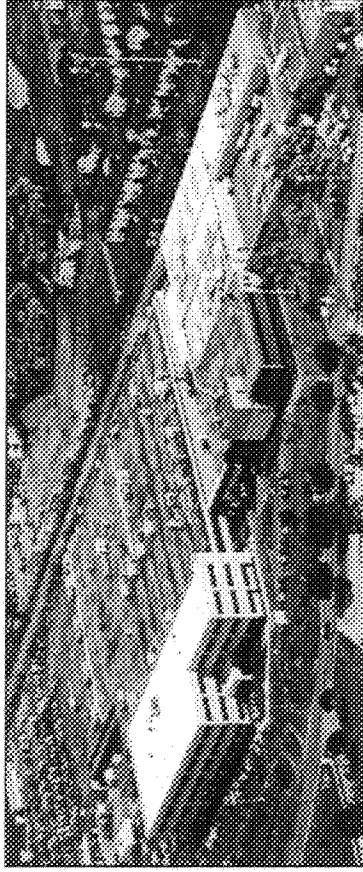
Raytheon



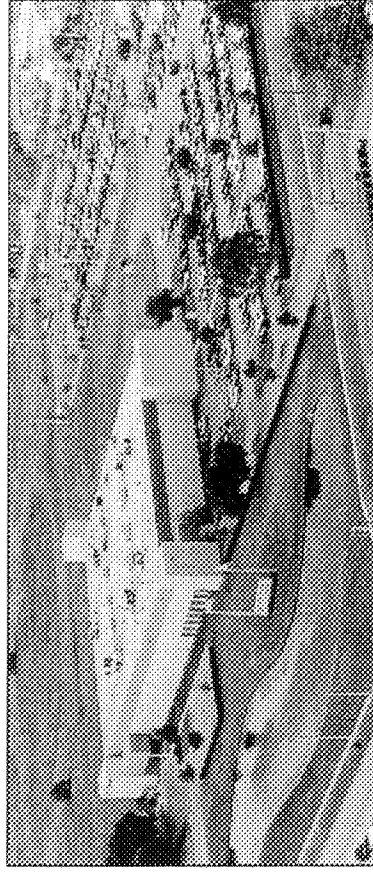
- Military and Commercial Space Avionics and Satellites
- 40 Years of Space Heritage
- 100% On-Orbit Mission Success
- Many Satellites have Exceeded Mission Life
- Programmable/Reconfigurable Communication Payloads
- Quick Reaction Remote Sensing Payloads
- Cover the Frequency Spectrum (VHF, UHF, X-Band, K-Band, EHF)
- Flight Proven products

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# St. Petersburg Resources



Administration, Engineering, and Manufacturing  
Facilities



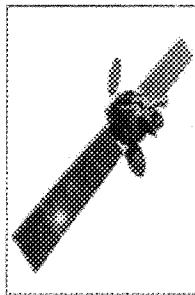
JSN/CEC Programs Facility

- ◆ 1000 Employees - 725 Engineers
- ◆ 456 Top Secret and 424 Secret Security Clearances
- ◆ Modern Network Technology Center
- ◆ 5 Antenna Ranges
- ◆ Failure Analysis Lab
- ◆ Extensive Environmental Testing Capability - 59 Test Chambers
- ◆ 3 Class 100,000 Clean Rooms
- ◆ 4 Main Buildings - 600,000 sq ft
- ◆ 24,000 sq ft SCIF space
- ◆ Modern 300,000 sq ft manufacturing facility in Largo with 800 employees

# Key Programs for Advanced Systems & Space Initiatives

**Raytheon**

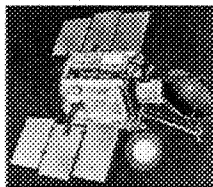
## Important Continuing Customers



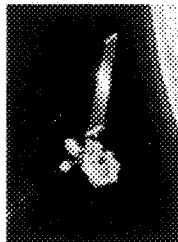
**MUOS/OPTUS Derivatives**



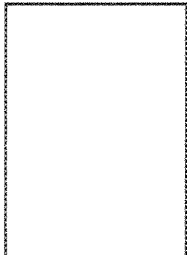
**GEO**



**QuickScat**

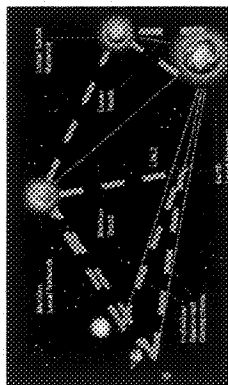


**Midori -2 (ADEOS-2)**

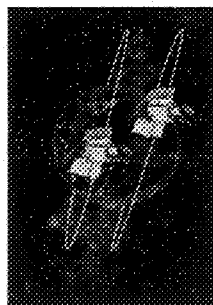


**Classified Communication**

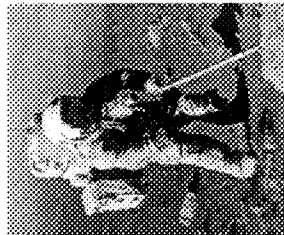
## New Starts and Opportunities



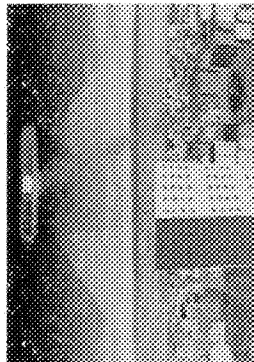
**ECANS**



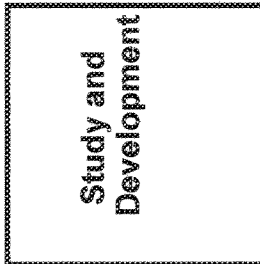
**Ocean Vector Winds**



**EVA Systems**



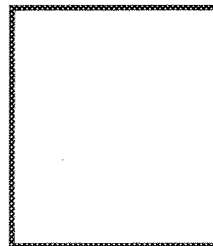
**DARPA NSC**



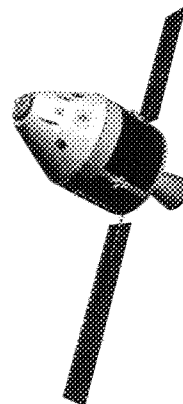
**Study and Development**

**Proprietary Concepts**

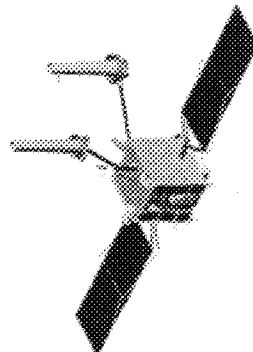
## Strategic Opportunities



**Oceans 11**



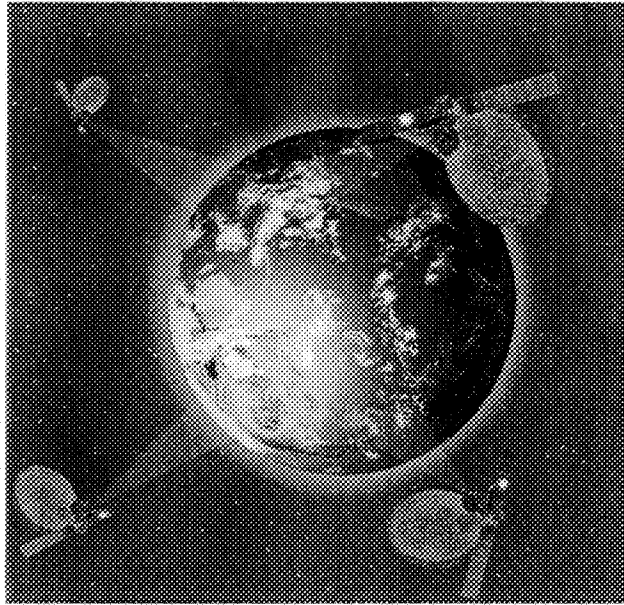
**CLV Avionics**



**MUOS UHF Gapfiller**

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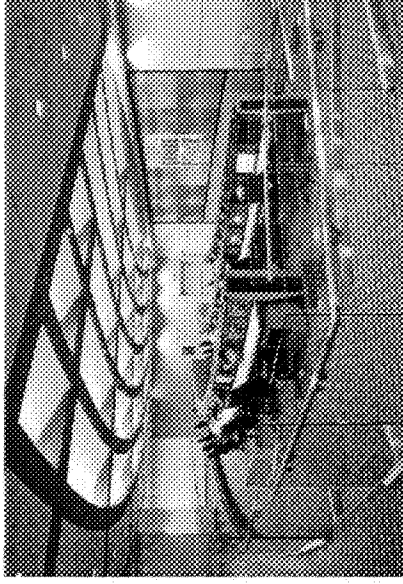
## Mobile User Objective System



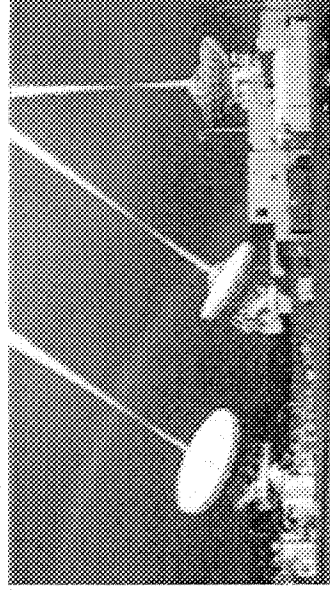
**System Engineering and  
Spacecraft Payload  
Integration**



**User Interface  
Waveform design  
Specifications**



**Network Control**

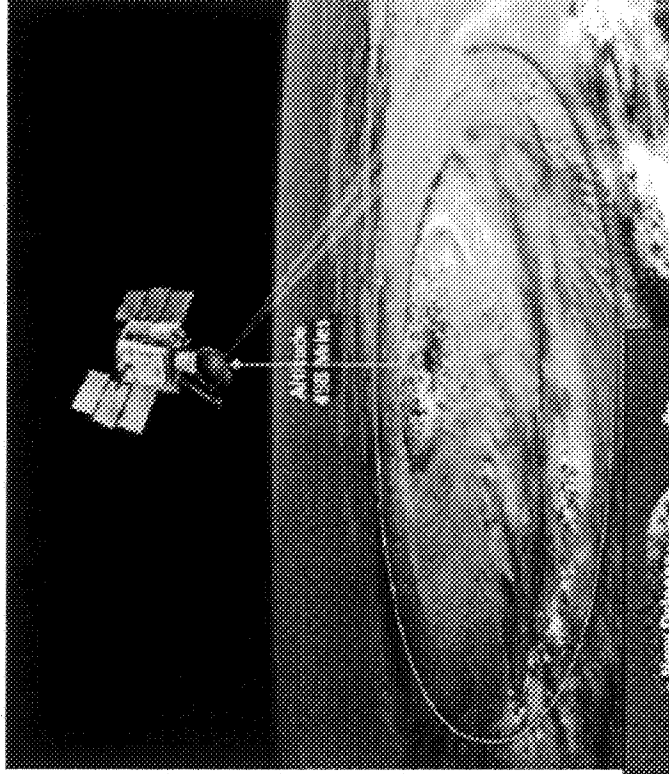


**Satellite Control**

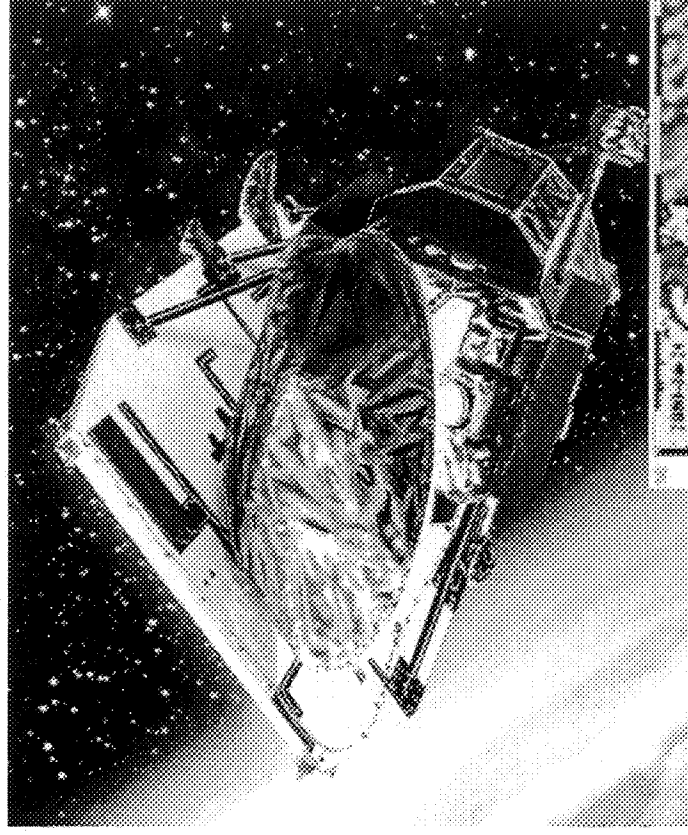
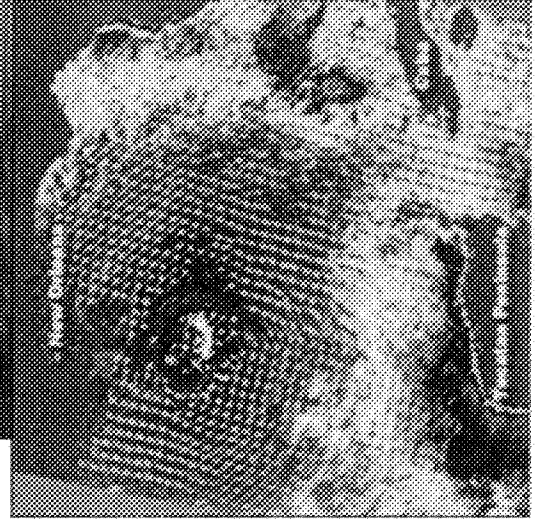
**The next generation UHF system will employ advanced satellite payload architectures, algorithms and technology to provide reliable and robust communications services to the future mobile warfighter.**

# Raytheon Satellite Sensors

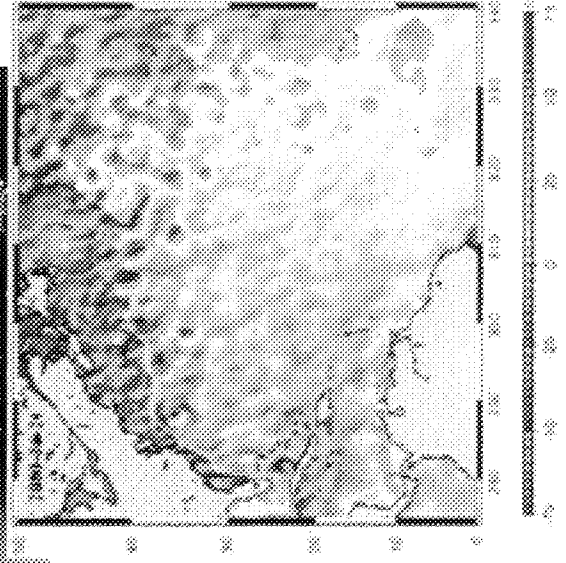
**Raytheon**



**Hurricane Katrina  
Wind Fields  
greater than  
100 mph**

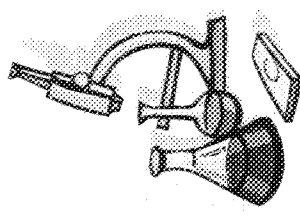


**Atlantic Ocean  
Wave Heights  
in centimeters**



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## **Strategic University Partnerships – Raytheon St Petersburg**



- **University of Florida – Computer and Information Systems  
Computer and Network Security &  
Senior Design Projects**
- **University of Central Florida – Central Florida Remote Sensing Lab  
Satellite and Remote Sensing Simulation**
- **University of South Florida – Wireless/Microwave Information Systems  
Antenna and RF Microelectronics Design**

**Matching funds from Florida High Tech Corridor economic  
development initiative expands the scope  
(Need more matching programs)**

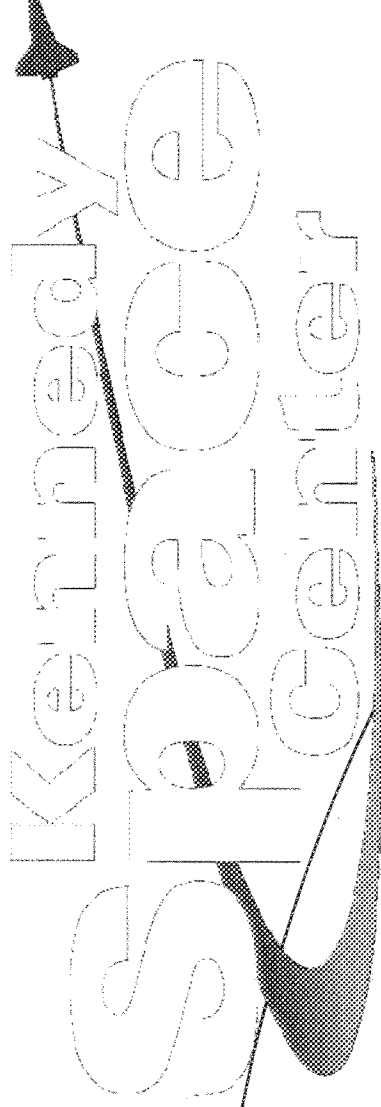


## Summary

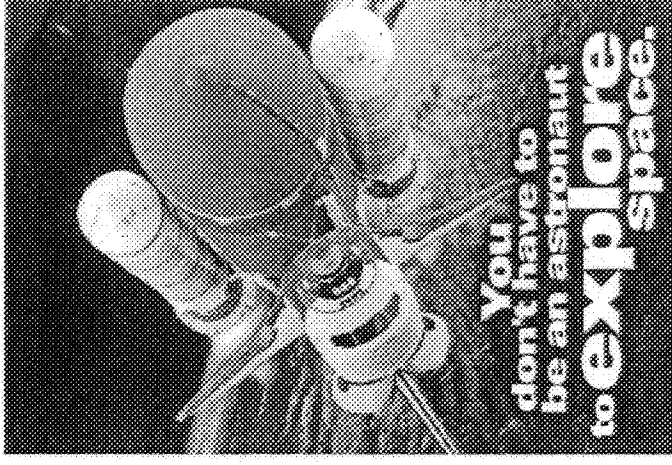
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- ◆ Many opportunities on horizon
- ◆ Many existing programs are struggling and may need Gapfiller approaches
- ◆ Florida has the expert companies to expand our piece of the pie beyond launch services
- ◆ Florida is a business friendly state – need to expand matching funds for space expansion

There has never been a time when  
relevant, reliable DoD, Classified and Civil Remote Sensing  
Space assets were more necessary



VISITOR COMPLEX



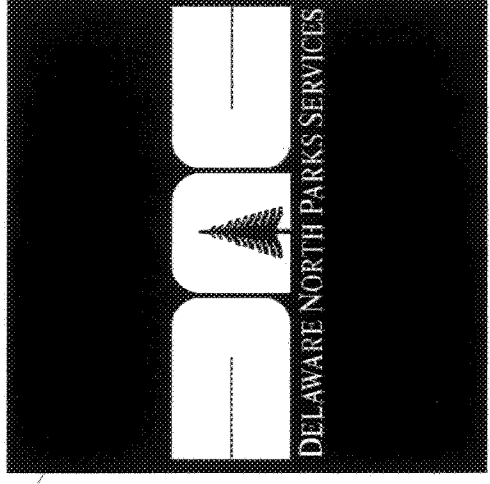
**Presentation to:**  
**The Florida House of Representatives**  
**Spaceport & Technology Committee**

**Tuesday, March 7, 2006**

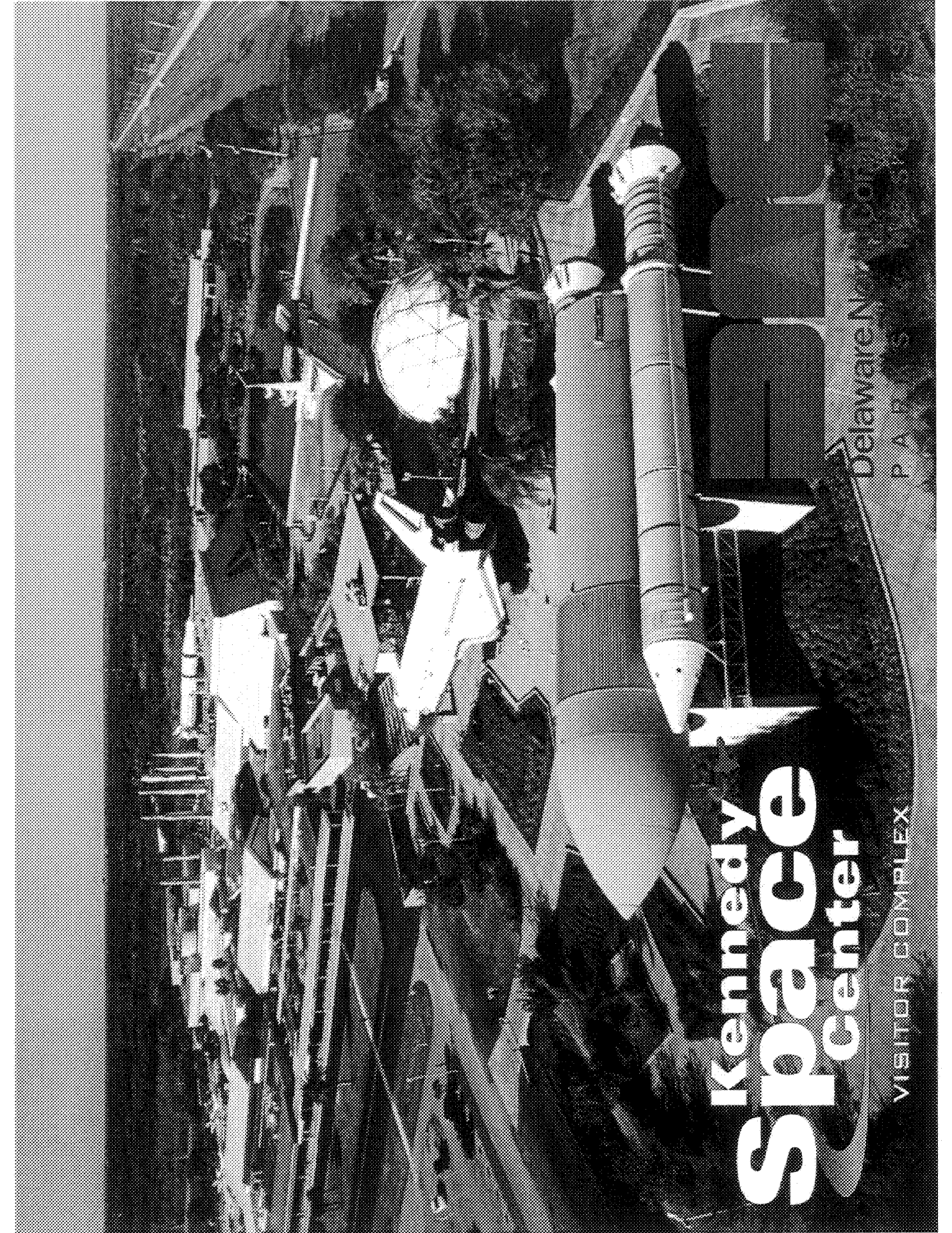
**Delaware North Parks & Resorts**

**Daniel LeBlanc, Vice President and COO**

**Billy Specht, Manager of Education**





An aerial, black-and-white photograph of the Kennedy Space Center Visitor Complex. The image shows a large parking lot filled with cars, several large white buildings, a prominent geodesic dome, and a massive model of a Space Shuttle on display. The shuttle is oriented vertically, with its nose pointing towards the top of the frame. The surrounding area is a mix of paved roads, parking lots, and landscaped grounds with trees.

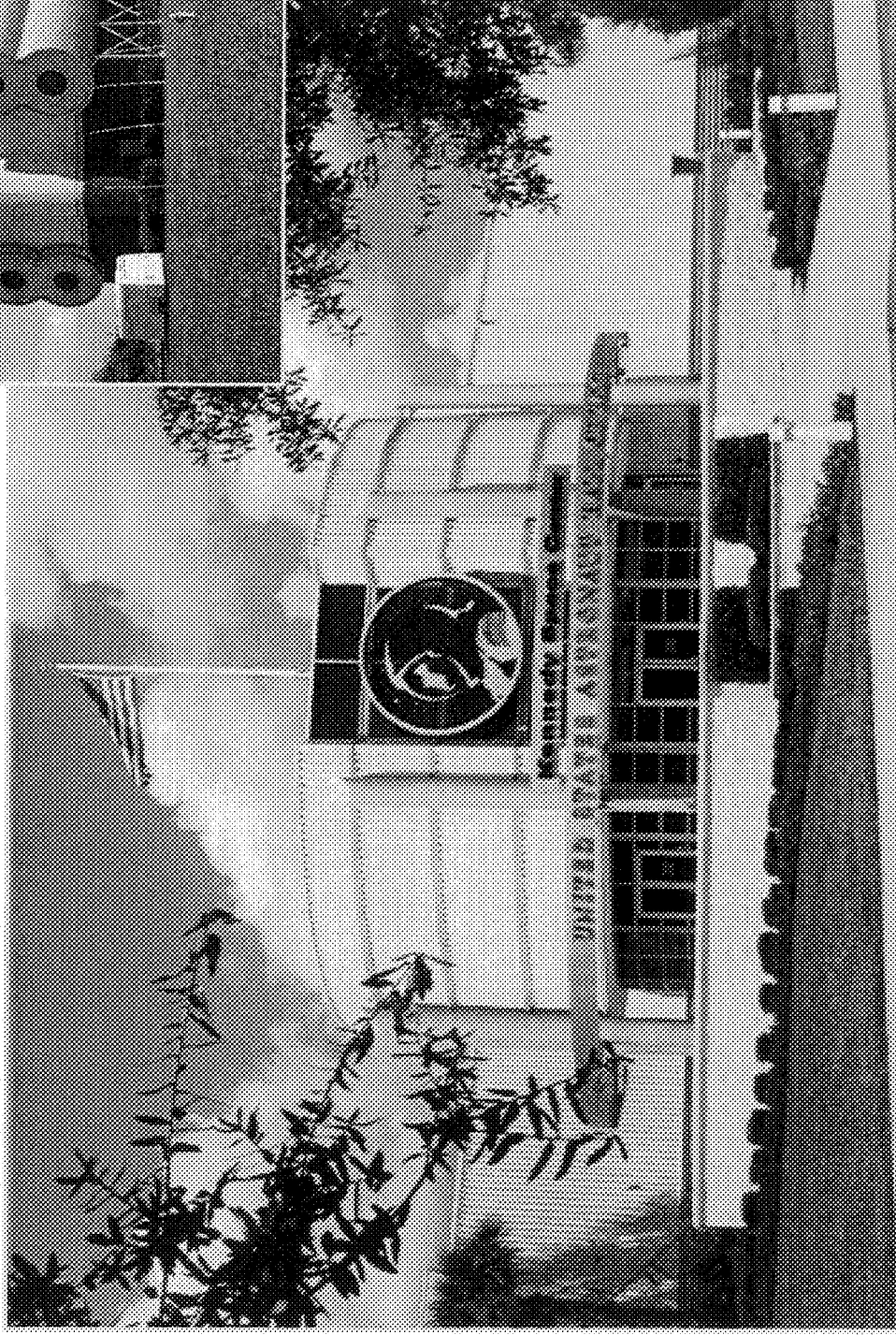
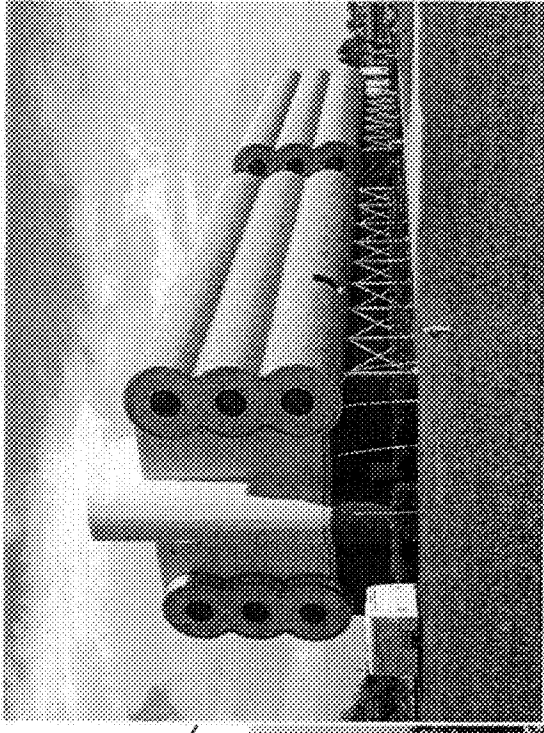
# Kennedy Space Center

VISITOR COMPLEX

Delaware North

P A R T N E R

# Astronaut Hall of Fame Museum

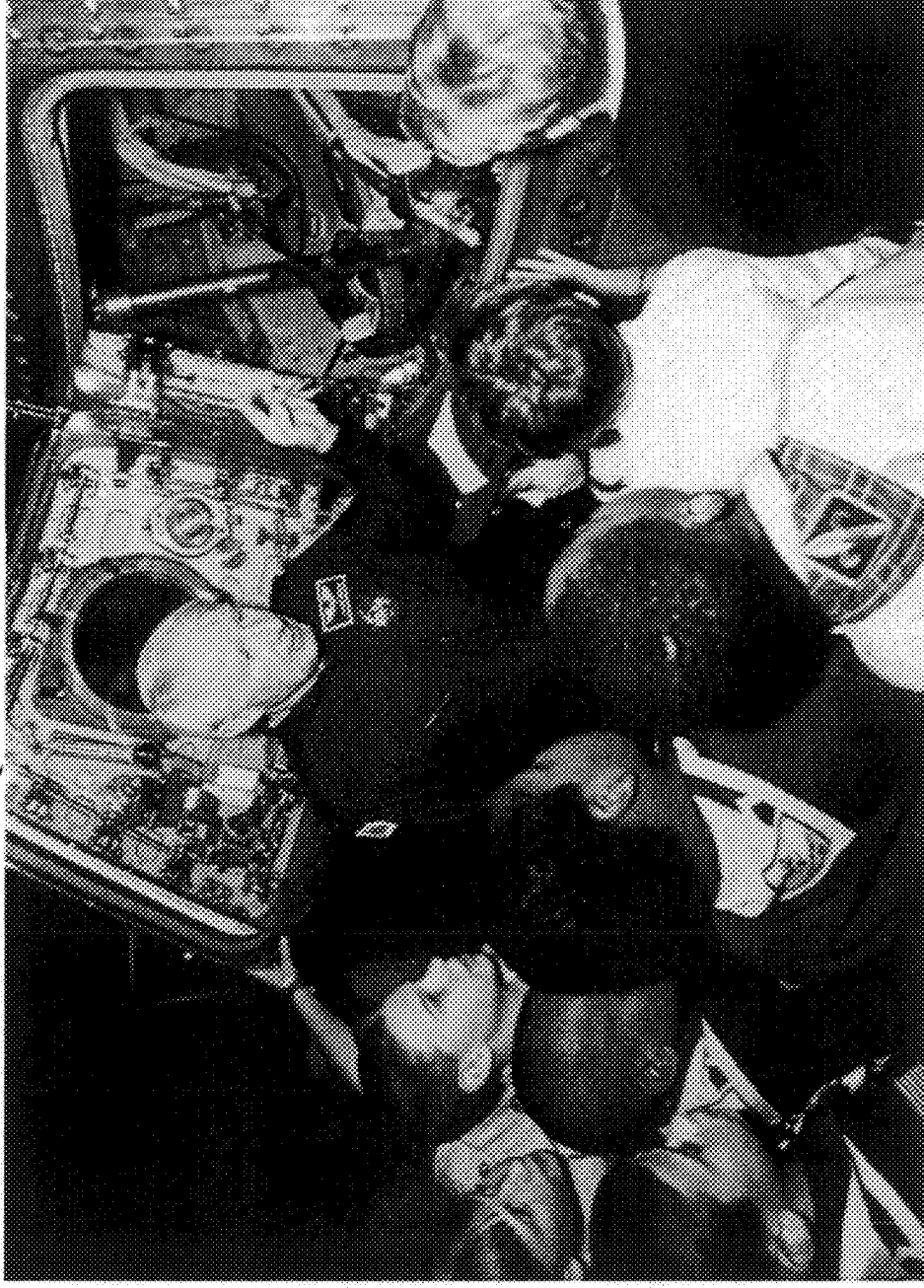


# Educational Field Trip Program

- Field Trips
- Educator's Activity Guides
- Student Bus Tours and 3D IMAX Films
- Approximately 100,000 student visits per year
- Educators Study Pass Program



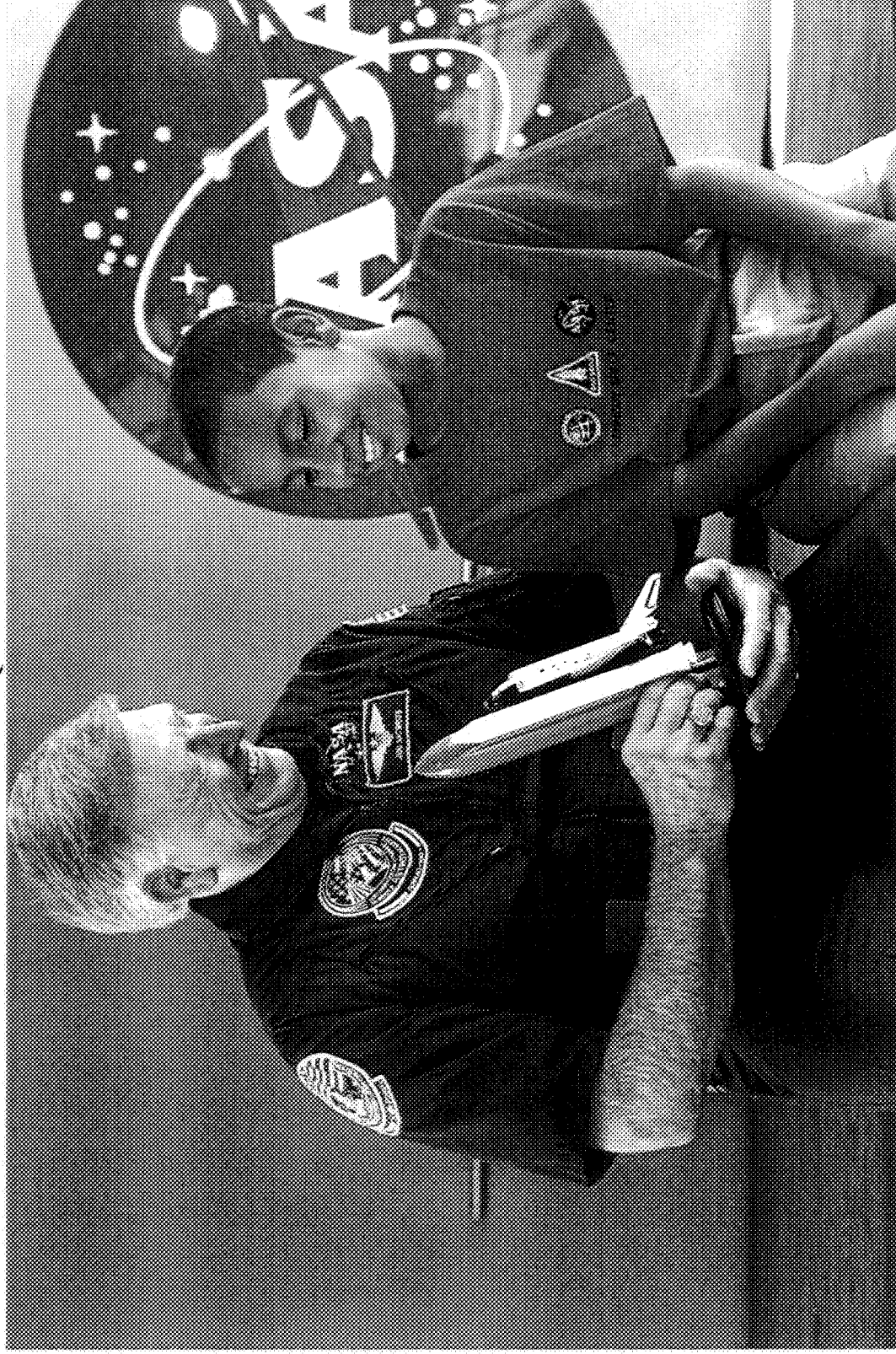
# **Our Mission:**



**To Tell the NASA Story and Inspire all People  
to Support the Exploration of Space**

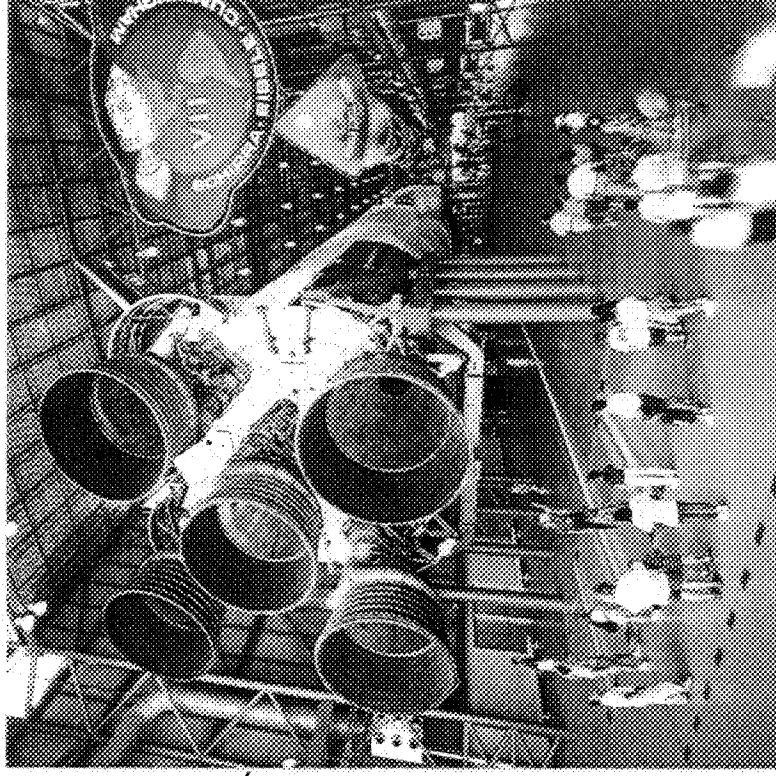
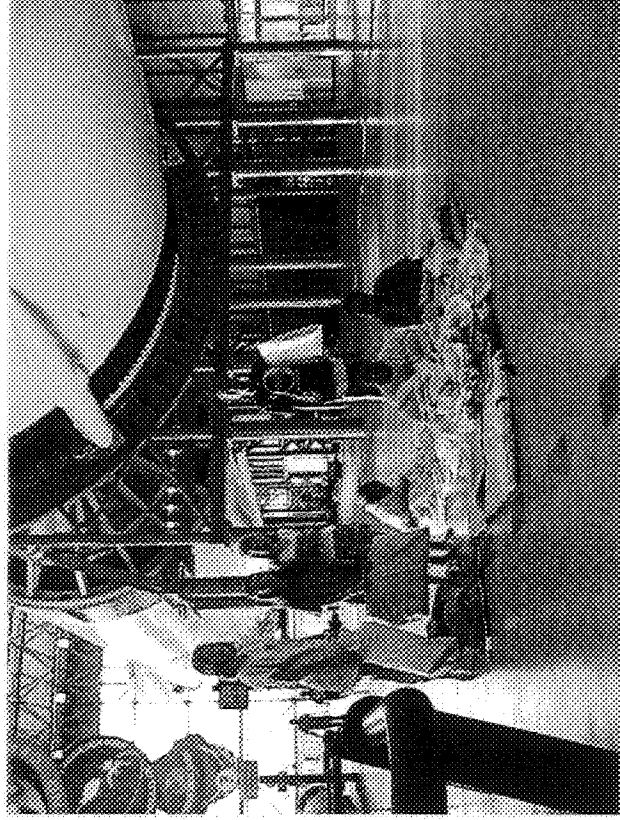


# Astronaut Encounter



# Overnight Adventures

- Visit KSC for a Sleep Under!
- Evening activities and events
- Program led by teachers and educators



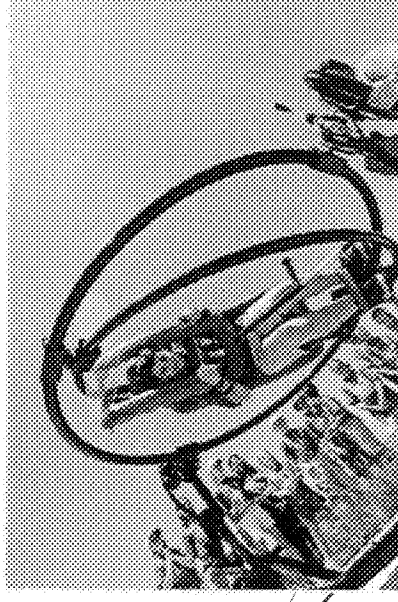
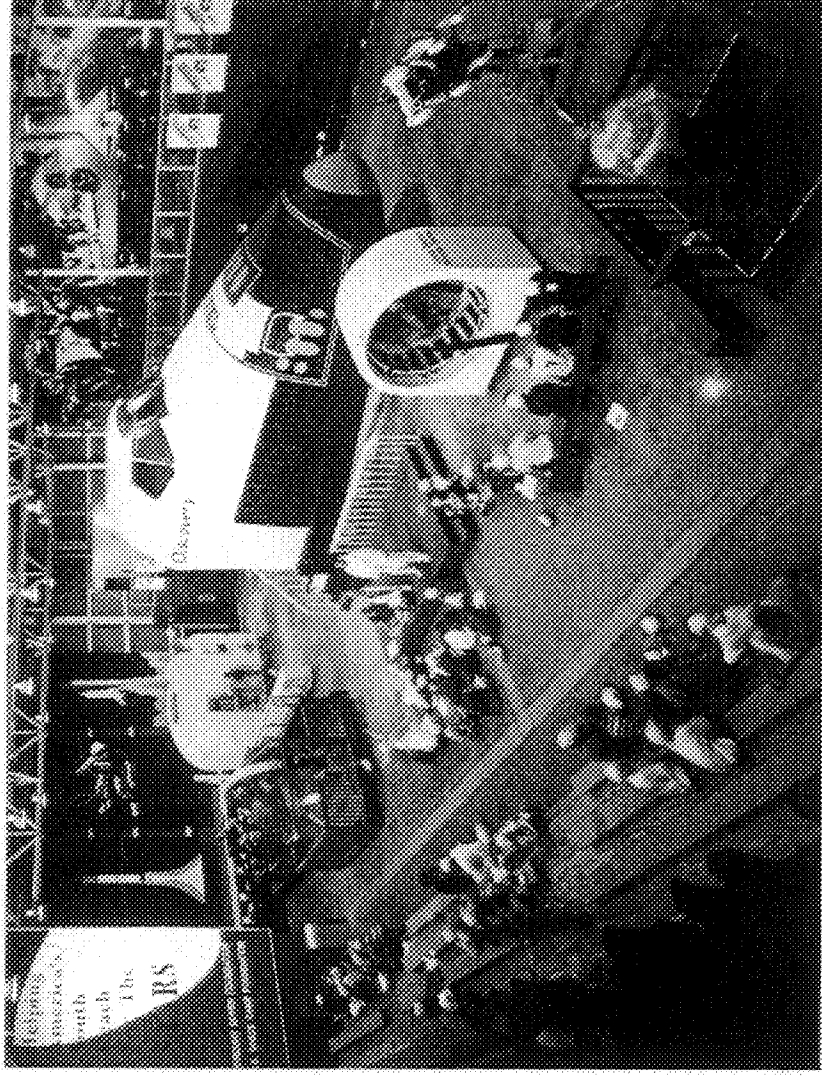
- Meets Florida Sunshine State Standards
- 6000 students in 2005

# Salute Programs



# Camp Kennedy Space Center

- One Week Day Camp Programs
- Perform activities and ride simulations
- Taught by certified teachers and educators

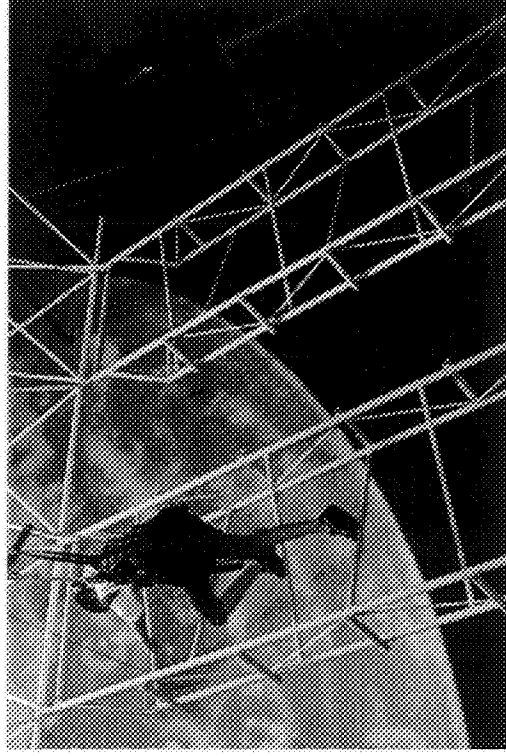
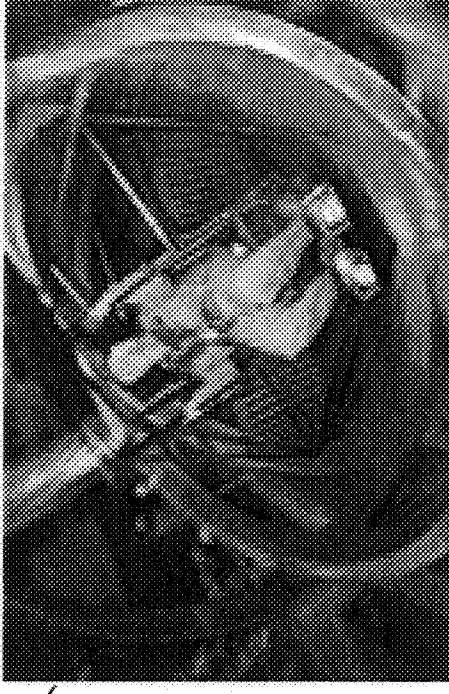


- Key Partnerships
- 2003 Relocated to AHOF
- 8<sup>th</sup> year of operation
- Approximately 1500 participants in 2005



# Astronaut Training Experience (ATX)

- Train like an Astronaut
- Behind-the-scenes KSC tour
- Discuss Space Exploration with an Astronaut
- Full-scale Space Shuttle simulation



# Brevard Space Week

- Original curriculum
- On-site science training for over 300 6<sup>th</sup> grade teachers
- Strategic Partnerships

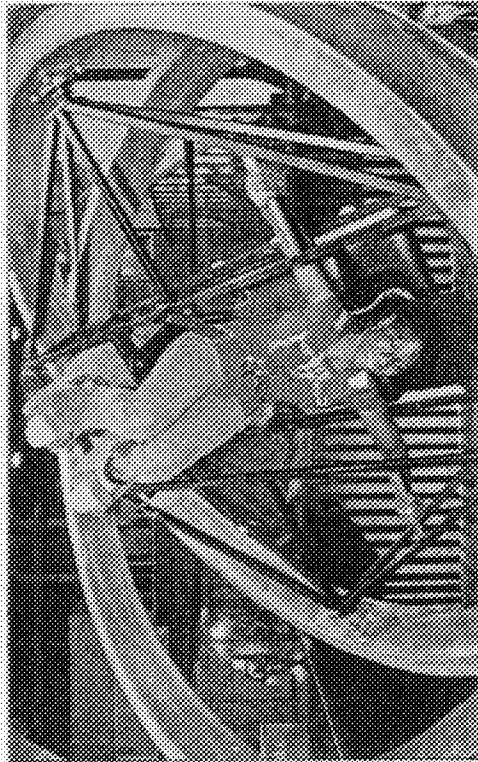


- 800 students per day
- Eight days of operation
- Interactive, informative, inspirational
- KSC Buses for transportation

# Brevard BLAST

“Some would assume that in Breck and Custer, everybody’s been out to the Space Center. For a lot of students who live right here, it’s their first trip.”

1. *Journal of the American Medical Association*, 1997; 277: 1039-1043.



Received and printed in Great Britain. A translation of this article appears in *Journal of the American Academy of Child and Adolescent Psychiatry*, 35:10, 1996, pp. 1233-1240.

## Program fuses space, school

[illegible]

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[illegible]

1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 26

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The following information is for the 2000-2001 season. The 2000-2001 season is the 10th year of the 10-year study. The 2000-2001 season is the 10th year of the 10-year study. The 2000-2001 season is the 10th year of the 10-year study.

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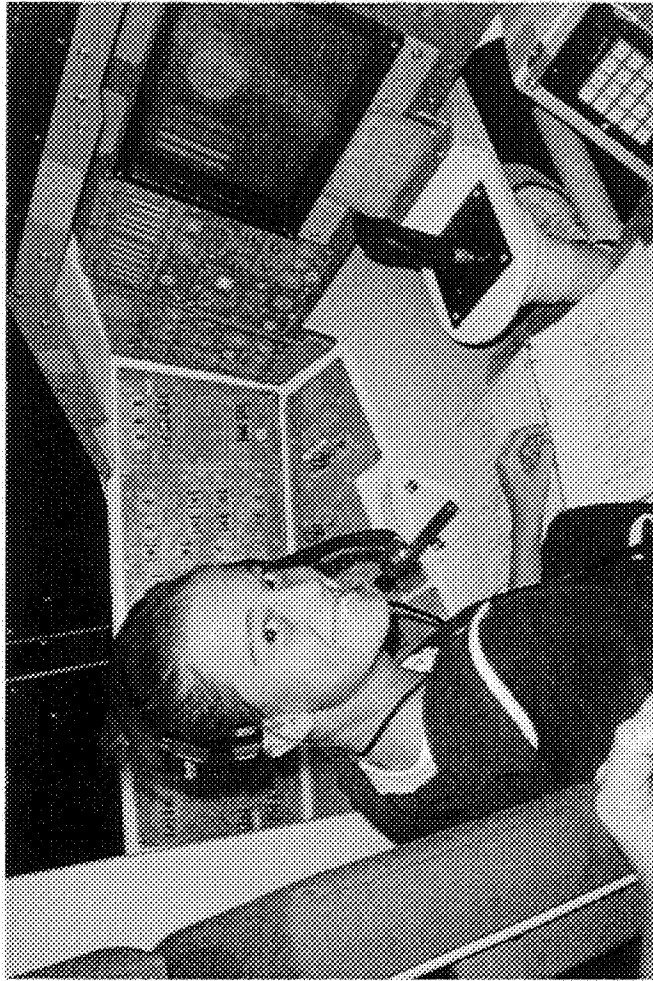
**Abstract**

the fact that the 1990s have been a decade of "renewed interest" in the study of the American West. The book is a welcome addition to the literature on the American West and is a must-read for anyone interested in the history of the American West.

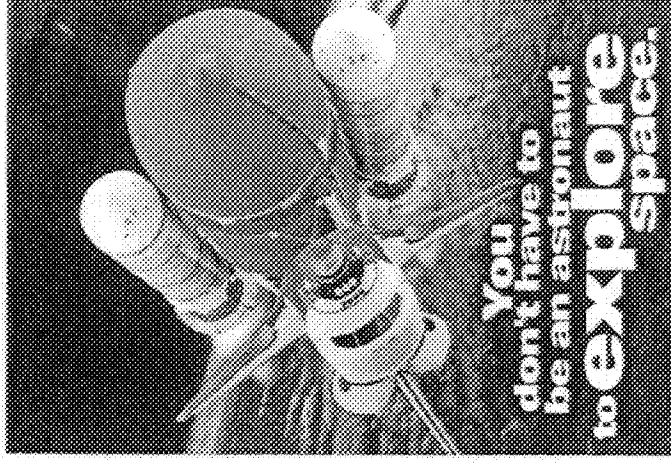
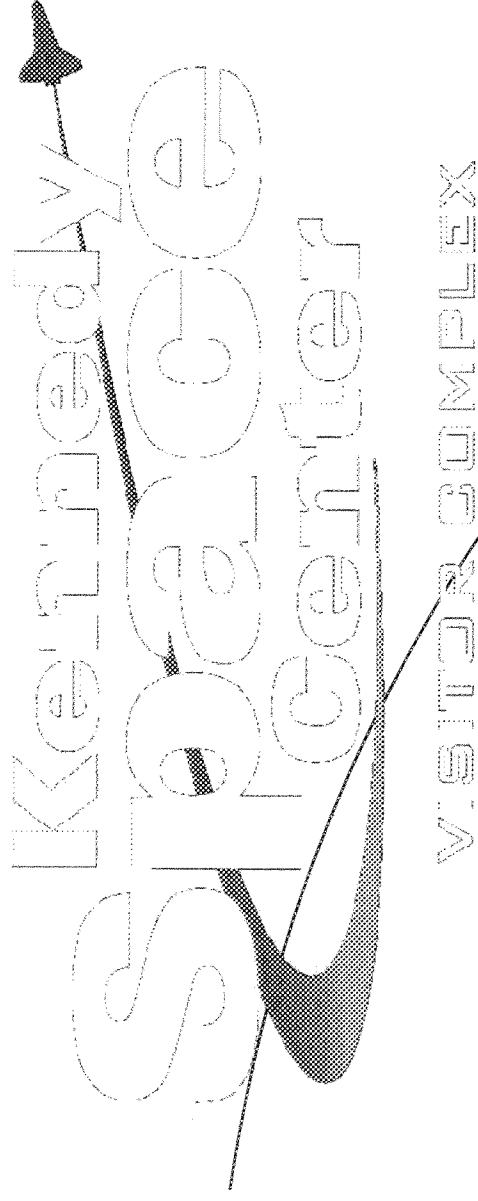
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1. *Chlorophyll a* and *Chlorophyll b* were determined using a spectrophotometer (Shimadzu UV-1601) at 663 nm and 646 nm, respectively. The concentrations were calculated using the following equations:  $Chl\ a = 12.7 \times OD_{663}$  and  $Chl\ b = 22.9 \times OD_{646}$ .

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Journal of Internal Medicine 258: 103–110

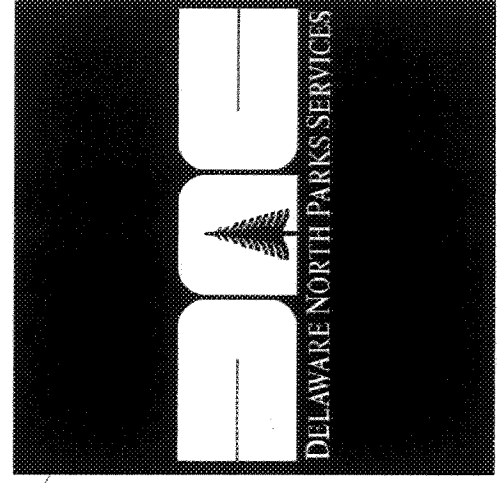
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- Strategic Partnerships
- Curriculum & Training
- 5000 7<sup>th</sup> grade students & teachers
- Full-day experience
- Discuss Teamwork, Space Exploration, Careers



**Presentation to:**  
**The Florida House of Representatives**  
**Spaceport & Technology Committee**

**Tuesday, March 7, 2006**  
**Delaware North Parks & Resorts**  
**Daniel LeBlanc, Vice President and COO**  
**Billy Specht, Manager of Education**



# Mathematics and Science Education: The Foundation of High Technology Business

## *Spaceport and Technology Committee* *February 7, 2006*

**Gerry G. Meisels**

*Chairman, Florida Coalition for Improving Mathematics and  
Science Education (CIMS)*

*Professor of Chemistry and Director, Coalition for Science  
Literacy at the University of South Florida*

**E-mail: [meisels@csl.usf.edu](mailto:meisels@csl.usf.edu)**

**Tel. 813-974-7183**



**FSMR** Florida  
Coalition for  
Improving  
Mathematics  
& Science  
Education



# Sections of This Presentation

1. Evidence for need to act decisively
2. Florida Summit on Mathematics and Science Education
3. Recommendations of the Commission
4. Implementing the recommendations



# The Need

- In the last five years alone, nine reports have sent the same message:
  - 75% of the future workforce will need knowledge and skills in mathematics and science to assure health and expansion of the economy
  - A majority of high school graduates are not adequately prepared in mathematics and science
  - Too few students are choosing college degrees in science, technology, mathematics, and engineering (STEM disciplines)
  - Too few students become science and mathematics teachers

**The reports are available at**

**[http://www.flsummit.usf.edu/key\\_reports.htm](http://www.flsummit.usf.edu/key_reports.htm)**



**FSU & S**  
Florida  
Summit on  
Mathematics  
& Science

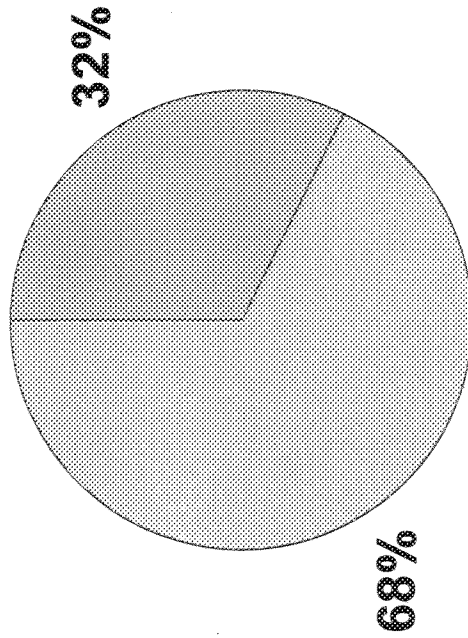


E D U C A T I O N

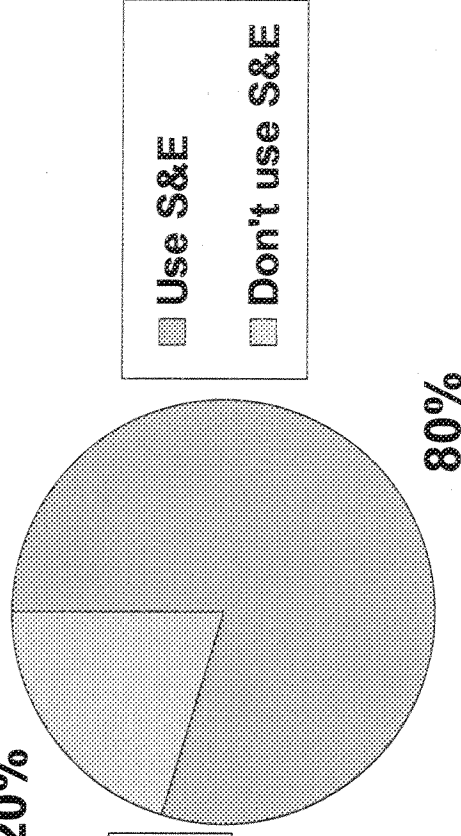


# Science and Engineering Skills Needed

S&E Jobs in the Workforce



Use of S&E Skills in the Workforce



Source: Science and Engineering Indicators 2002 Appendix Table 3-2, Page A3-5.

Note: SESTAT definitions of "S&E" and "Non-S&E" occupations.

Source: Calculated from Science and Engineering Indicators 2002 Text Tables 3-1, 3-2, pages 3-6, 3-7.

Note: "Use S&E skills" includes all those in SESTAT-defined "S&E" jobs and those in SESTAT-defined "Non-S&E" jobs who "closely" or "somewhat" use S&E skills in those jobs.

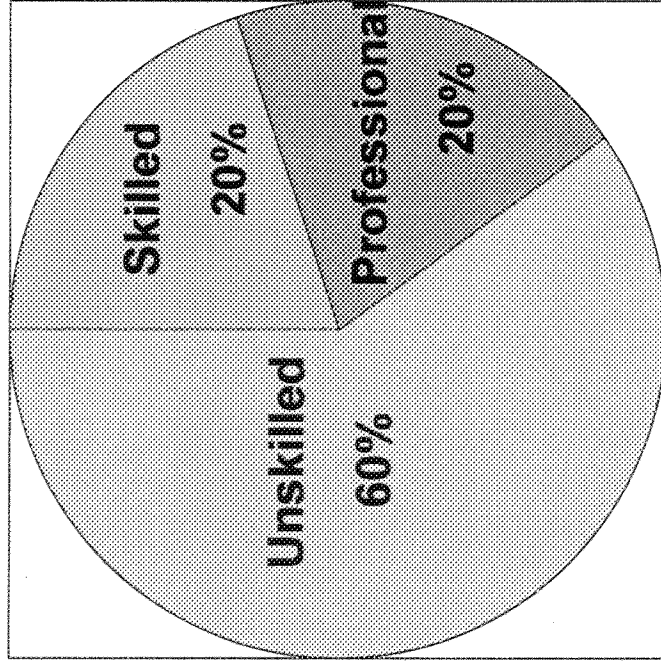


E D U C A T I O N

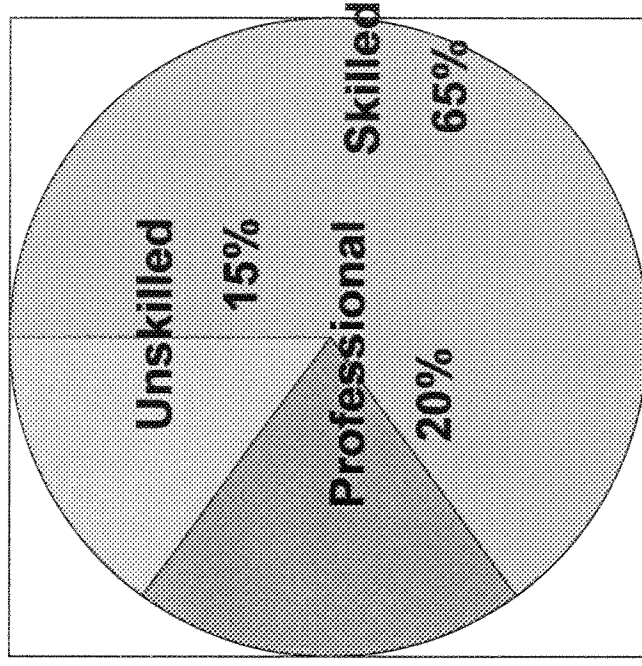


# Changes in Skill Level Needed

*National Summit on 21<sup>st</sup> Century Skills for 21<sup>st</sup> Century Jobs*



**1950**



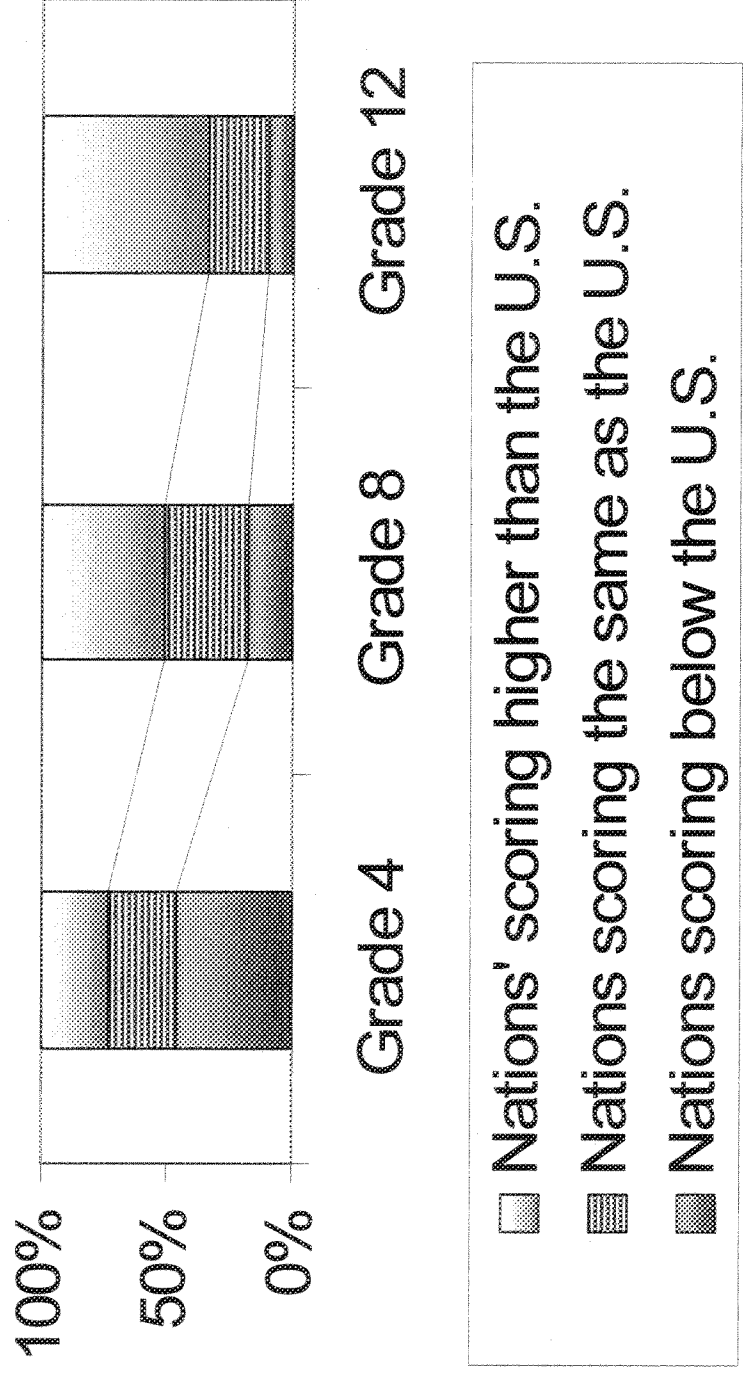
**1997**



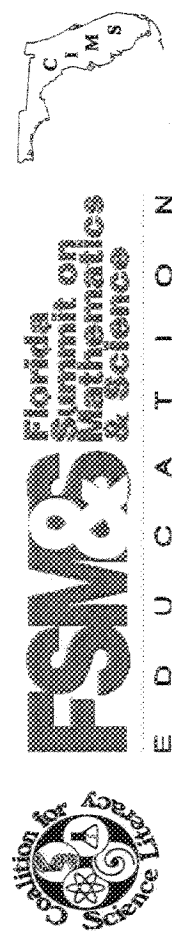
**FSM&S** Florida Summit on Mathematics & Science Education



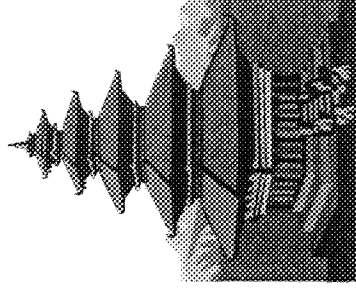
# Average Mathematics Performance of Other Countries Compared with the U.S.



Source: TIMSS (*Trends in International Mathematics and Science Study*)



# Foreign Born STEM Professionals



- We have relied heavily on foreign-born STEM professionals, 37% in 2000 (up from 23% in 1990;  
Source: US Bureau of the Census
- China and India are building both new universities and STEM development centers  
Source: multiple; most recent Yahoo News March 3, 2006, quoting Chinese Education minister Zhou
- Visas issued to foreign M/S professionals have decreased 37% since 9-11
- We can no longer count on a long-term supply of foreign-born STEM professionals



**FSM&S** Florida  
Summit on  
Mathematics  
& Science

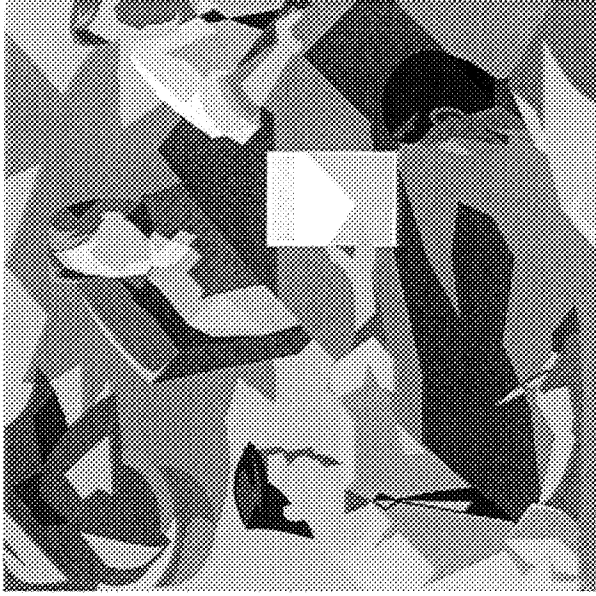


# Sections of This Presentation

1. Evidence for need to act decisively
2. Florida Summit on Mathematics and Science Education
3. Recommendations of the Commission
4. Implementing the recommendations



# Florida Summits on M/S Education February and December 2005



*Supported by the National Science  
Foundation and others*

## ***Goal:***

***Identify action steps that  
will enhance Florida's  
economic development  
by preparing a workforce  
educated in mathematics  
and science***



**FSM&S** Florida  
Summit on  
Mathematics  
& Science



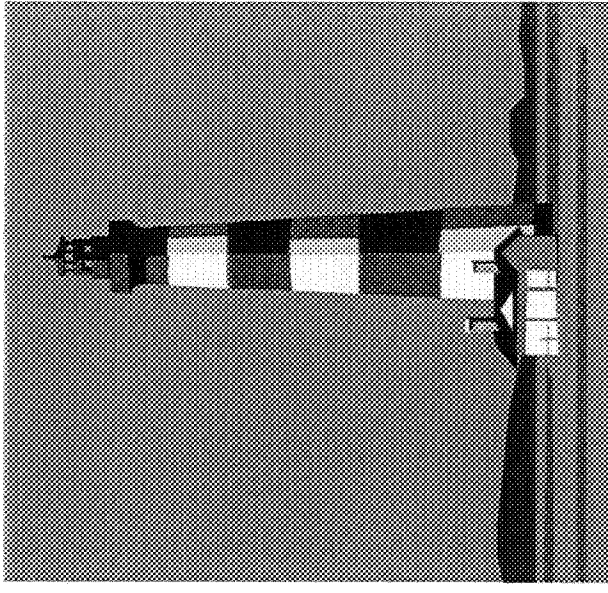
E D U C A T I O N

# M/S Education is the Foundation for Florida's Technology-Related Strengths

- Aviation - Aerospace
- Information Technology
- Biotechnology and other life-science related fields
- Homeland Security and Defense

(note: they require US Citizen professionals)

Source: Enterprise Florida



**FSM&S** Florida  
Summit on  
Mathematics  
& Science



E D U C A T I O N



# Objectives

1. Improve all students' learning in mathematics and science. Measures include comparisons:
  1. National (NAEP) and
  2. International (TIMSS)
2. Increase student interest in the scientific disciplines. Measures include increases in
  1. Number of college graduates in STEM disciplines
  2. Numbers of students in AP and other advanced classes
3. Increase the number of highly qualified teachers of M/S at all levels by
  1. Increasing the number of Florida college graduates in mathematics and science education (now 6% of need)
  2. Increase recruitment and retention of mathematics/science teachers from related professions (career-change entrants) (Robbing Peter to pay Paul?)



**FSU & S**  
Florida  
Summit on  
Mathematics  
& Science



E D U C A T I O N

## 4. Increase Public Awareness

- 50% of students do not think that studying mathematics and science is important
- 76% of students think they are taught enough math and science now
- 64% of parents do not think we need better mathematics and science education
- But 80% of the workforce will need mathematics and science skills (slide 4)!

Source: Reality Check 2006, Education Insights of the Public Agenda



**FSU & S**  
Florida  
Summit on  
Mathematics  
& Science



# Sections of This Presentation

1. Evidence for need to act decisively
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# Governor's Commission on the Future of Space and Aeronautics in Florida

The following are based on SUMMIT recommendations

3. Establish a Center for Mathematics and Science Education Research to enhance K-12 mathematics and science instruction quality.
4. Improve K-12 mathematics and science teacher availability through a greater emphasis on teacher recruitment.
5. Expand enrollment in, completions of, and retention of graduates from post-secondary degree programs in mathematics, science, and engineering ....
6. Provide hands-on opportunities for students to experience and learn .....
7. Increase general awareness .....



# Broader Impact

CIMS believes that the Commission's recommended actions would provide educational underpinnings for all sectors of Florida technology business and industry, and provide substantial long-term benefits for Florida's economy and citizens.



# Sections of This Presentation

1. Evidence for need to act decisively
2. Florida Summit on Mathematics and Science Education
3. Recommendations of the Commission
4. Implementing the recommendations



# Legislative Action

- State's Aerospace Industry Bill, especially Section 61, Creating Section 1004.86 of the Florida Statutes, Florida Center for Mathematics and Science Education Research
  - HB1489
  - SB2580
- The tasks assigned provide detail and are reasonable, comprehensive, and needed.
- An appropriation should be provided that is adequate to allow the center to meet the bill's expectations.





# Resource Implications

- The Center is an excellent and appropriate first step.
- Florida has 55,000 elementary and 12,000 secondary mathematics and science teachers
- The Summit showed that industry spends about \$1,500 per employee to keep them abreast of new developments
- Major improvement cannot be achieved without a program that is similar in scope and cost to Just Read, Florida!



**FSM&S** Florida  
Summit on  
Mathematics  
& Science



## **Information Provided by:**

**Dr. Ben Goldberg, Pratt Whitney**

**I appreciate the opportunity to provide input for your consideration, and apologize for not being able to be there in person. My input today is divided into four areas:**

### **1) The Pratt & Whitney Weekly Reader Insert Education Outreach activity - and associated augmentation potentials**

Pratt & Whitney Rocketdyne has developed an education outreach activity that inspires youth toward careers in science and math. It has a specific focus for young ladies. The activity is partially funded by NASA under contract for an engine that supports the Vision for Space Exploration. The activity targets 4th graders. The NASA contract only funds development of the content (<\$8,000) for what has developed into a four page insert for Weekly Reader magazine. We anticipate this will be a school year quarterly release (no summer issue) for multiple years - so three times per year in October, January and April. NASA funding is being used to develop the content for the first 3 Weekly Reader Supplements (2005/2006 school year) and associated Teacher's Guides and a Website (funding provides for a high school intern - which is consistent with our "by students - for students" approach).

P&WR funding is being used to pay for distribution of the first two Supplements - one for October 2005, one for January 2006 - we do not, as yet, have funding secured for the third Supplement. We are partnered with the Florida Space Research Institute as the host of the Website. We are also looking to partner with AIAA as part of this outreach activity, to have local members assist in teaching on the days the magazine is released - the exact scope is not finalized but is in work.

Total distribution for each Supplement is a nationwide audience of ~580,000 4th graders, in about 21,000 classrooms. One of the features of each Supplement is that a 4th, 5th or 6th grader will interview a Space figure of their choosing. Other features include articles, a timeline and games (science / space related). The inaugural issue request from our student was Sally Ride and we had a fifth grader do that interview. For the second issue we had a 7<sup>th</sup> grade student interview a designer of the Shuttle's Main Engines.

**Proposed for your consideration:** Florida could partner with P&W, NASA and FSRI for the April insert. This partnership could have two substantive components:

- a) FSRI coordination of industry and teacher resources throughout the state, using the already available networks, to participate in the schools where the insert is distributed. These include schools in 153 cities in Florida, from Alachua to Zephyr Hills.
- b) State funding of the distribution costs (~\$35,000) for which P&W would center the insert on Florida's future as the U.S. center of Space Launch.

This would reach more than ½ million homes and include website companion articles / games. See attached potential cover (#3). Useful for both advertising, Florida aerospace message focus and education outreach.

## **2) Considerations for FCAT**

**Proposed for your consideration:** Without changing any of the math, reading or other evaluation elements of this exam, the State could chose to prioritize the aerospace industry by centering the questions around aerospace issues. An example:

**Existing word problem example:** Tom and Betty each have four apples. Tom gives Betty two apples. How many apples does Tom have left?

**New word problem example:** Tom and Betty each have four astronaut helmets. Tom gives Betty two astronaut helmets. How many astronaut helmets does Tom have left?

This focus will be evident to students and teachers and should enable discussion around aerospace topics and fields as part of the test preparation activities. It could be a powerful tool for exciting students and recognizing Florida's aerospace interests.

## **3) Focus opportunities for Florida Education Outreach**

As a parent of two children (11 and 18) it is not clear that math and science are focus areas for Florida's pre-college education outreach activities. Most studies indicate that, by the time students reach college it is too late to influence their careers toward math and science, so this gap is significant for a State focusing on aerospace opportunities.

A search of Florida Websites (key words Florida Education Outreach) revealed the following:

Of the 15 sites hot-linked to the bureau of Family and Education Outreach [www.firn.edu/doe/family/home0077.htm](http://www.firn.edu/doe/family/home0077.htm), only 1 had any mention (and that in the detailed web pages) of math (21<sup>st</sup> Century Community Learning Centers – says math in addition to reading). By contrast, several were specifically targeted to reading (e.g. Families Building Better Readers, Just Read Families) and several others specifically included a reading focus in their detailed web pages.

Assessment of the 2004 Safe Council Report also indicated a focus on high school and college.

A search on web sites for other states indicated similar lack of focus.

**Proposed for your consideration:** Many studies indicate it is not the lack of resources or programs, but a lack of knowledge of the availability of programs by potential users. Florida has the potential to take a national leadership role, and significantly affect the efficacy of local education outreach activities by creating a “Families for Better Math and Science”, or “Its Just Math” etc... coordination activity. This should not be new programs, but an effort to coordinate existing ones, that makes a user friendly one-stop venue. The state could use the models and methods developed to promote reading as a template for the math and science areas.

#### **4) Considerations for general industry involvement and associated needs**

A brief study indicating the percentage of secondary and postsecondary students who come from in state might be valuable in determining whether the focus should solely be on secondary and postsecondary education, or whether the focus should include middle and high school as well. The loss of math and science students occurs during 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> grades according to numerous studies. Industry has focus on these students because of its understanding of the long term needs.

There does not appear to be a statewide focus within the state university system for aerospace. As such it may be difficult to gain national recognition, and consequent funding, research opportunities and national leaders in this area to come to the Florida system. Careful evaluation of the benefits and consequences of such focus may be appropriate. There are three areas of interest to all industry that may be worthy of further focus:

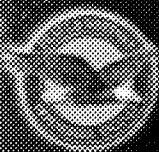
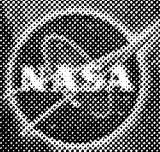
- a) Intellectual property (IP) considerations between government, industry, and academia are often inhibiting to industry funded R&D activities, which provide approximately 60% of the U.S. R&D funding. FSRI initiated an approach to develop some common language for IP considerations between industry and academia. Further development along this path, to include the state activities, and uniformity within the state university system, may be of value.
- b) There is significant potential for university systems to minimize capital expenditures while maximizing capability through selected common use laboratories or facilities. The SERPL facility approach is one model, agreements for use of test or unique instrument capability at KSC or in-state industry test sites might be another viable avenue. Selection of the highest inducement equipment, facility or test capabilities might indicate the most advantages approach.
- c) While state grants and tax structure items seem designed to assist industry it appears there is a potential innovative synergy with R&D that remains unexploited. The aerospace industry has significant difficulty implementing technology, so-called technology insertion. This is primarily due to the large costs of certification required for the high reliability systems, and the significant

issues associated with unexpected results. The lack of technology insertion funding has, in some cases, precluded state-of-the-art technologies from being incorporated in today's systems. This has the potential to result in a reduced competitiveness for U.S. industry in the global market, or reduced missions / launches. The potential for the state to define technology insertion agreements with industry, that allow state return on investments over time, might be a substantial, and untapped space-industry growth incentive.

Each of these areas has the potential to affect college and post-secondary education efforts within the state, and the consequent ability of the state to attract and maintain high tech industries.

Although unforeseen circumstances precluded my attendance today I remain available to discuss these items or other items of interest at your convenience.

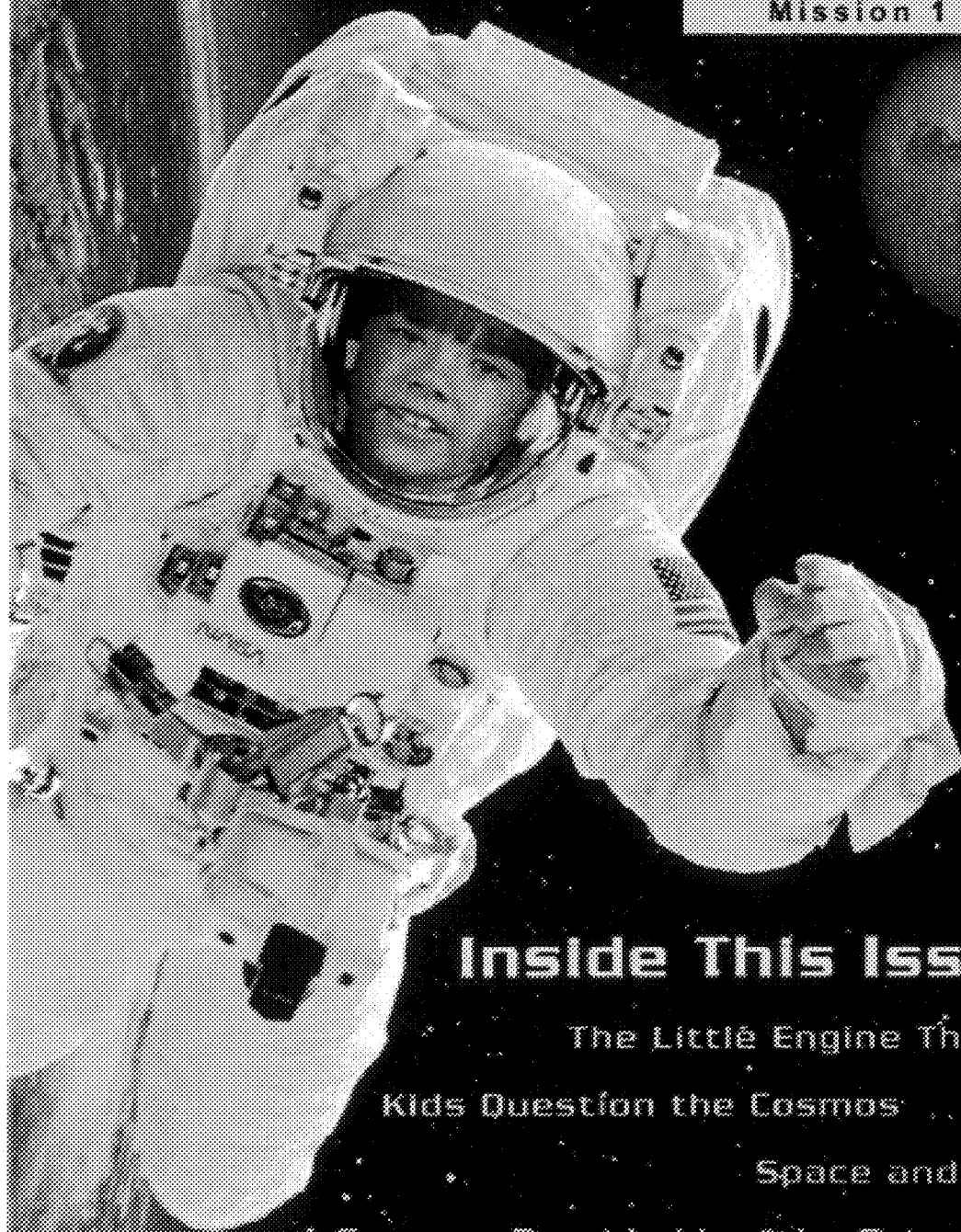
**Ben Goldberg**  
**Director**  
**Engineering and Advanced Programs**  
**Pratt Whitney**



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